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EXAMINER

PERILLA, JASON M

ART UNIT	PAPER NUMBER
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2634

DATE MAILED: 06/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

2634

Part of Paper No./Mail Date 20050603

DETAILED ACTION

1. Claims 27-54 are pending in the instant application.

Response to Arguments/Amendments

2. Applicant's arguments, see page 10, filed March 14, 2005, with respect to the rejections under 35 U.S.C. § 112, second paragraph, as applied in the office action dated December 10, 2004 have been fully considered and are persuasive. The rejections under 35 U.S.C. § 112, second paragraph, have been withdrawn.

3. The Applicant's arguments with respect to the rejection of claims 36 and 52 under 35 U.S.C. § 112, first paragraph, have been considered, but they are not persuasive. The Applicant cites Chapter 15 of *Internetworking Technology Overview* which does not provide any evidence of the use of both ADSL and VDSL on the same wire. Regardless, the Applicant must rely upon the disclosure of the instant application to enable the subject matter it claims.

The Applicant further notes page 7 of the specification as enablement for the use of both ADSL and VDSL on the same subscriber line. Page 7 of the specification does read:

"An interesting aspect of the duplex technique employed in the present invention is that co-existence problems with ADSL can be solved. The problem with mixing ADSL and VDSL on the same wire is the large NEXT from ADSL into VDSL. With the present invention it is possible to solve this problem without any NEXT between ADSL and VDSL. If we let the up-stream and down-stream bands, in the FDD band be the same as the band used in ADSL, and the power boost used for these bands be the same as the power levels used in ADSL."

While the specification reads "on the same wire" it is disputed by the Examiner that the true meaning of the phrase in the context of the instant application is rather --in the same binder--. That is, the problem with utilizing both ADSL and VDSL on separate wires in the same binder is near-end cross-talk (NEXT). In the art, a binder is known as a group of POTS/subscriber lines that enter a network unit in a "bundle" (tightly bound together). In this form, voltages on one particular line may capacitively couple to another line in the bundle to cause interference. Page 7 does additionally recite:

"In Figure 1 there is shown two different line lengths with 2 groups of VDSL modems. The distance between the ONU and group 2 is less than X meters and the distance to group 1 is larger than X meters. The precise value of X is a design choice. With the new method, group 1 modems only use FDD which eliminates NEXT between group 1 modems as well as lower frequencies, if the extra cyclic prefix is dimensioned for X meters. If all requirements for OFDD are fulfilled, there will be no NEXT between group 2 modems. If timing advance is calculated for each wire, then the symbols transmitted from the group 1 modems will be inside the extra cyclic prefix for the part of the wire where the two groups affect each other and the requirements for OFDD are fulfilled."

Here, the specification relates NEXT between modems. Surely, Applicant does not contest that each modem has its own subscriber line. Indeed, each modem has its own line and the invention of the instant application solves the problem of interference using ADSL and VDSL between lines in the same binder.

As further evidence of the Examiners proposed correction to the meaning of the body of the specification, the reference Cioffi (US 5673290; previously cited) clearly relates that the problem with using ADSL and VDSL in the same

Art Unit: 2634

binder is the NEXT generated between separate subscriber lines in the binder (col. 3, lines 23-30).

In conclusion, the Examiner suggests that the use of ADSL and VDSL on the same subscriber line convolutes the meanings of the two types of subscriber line transmission. Definitively, ADSL and VDSL overlap at least in part, and could not conventionally be utilized together on the same subscriber line as claimed. Such would be equivalent to having two separate and static voltages on the same wire, simultaneously. Rather, the phrase "on the same wire" was likely a translation error or likewise meant to bear an actual meaning of –in the same binder– and is not enabled.

4. The Applicant's arguments with respect to the prior art rejections set forth in the office action of December 10, 2004 have been considered, but they are not persuasive. The Examiner insists that the conditions for a prima facie case of obviousness are clearly met by the application of the art rejections including Bingham et al (US 5838667; hereafter "Bingham") in view of Eames (US 6282189) as set forth in the office action of December 10, 2004 and restated below. It is suggested by the Examiner that the Applicant simply overlooked the teachings of the prior art references Bingham and Eames to make the conclusion that the Examiner engaged in impermissible hindsight reasoning. However, such is not the case because the combination of Bingham in view of Eames derives "teachings" of the combination through its own disclosure only.

The Applicant relates that there is no teaching of subscriber lines being grouped into longer and shorter lines based upon a system parameter. However, the

Art Unit: 2634

disclosures of Bingham and Eames are replete with teachings to group subscriber lines for the purpose of achieving specific bit rates tailored to a particular line length.

- ADSL provides low bit rate transmissions at low frequencies (Bingham; col. 1, lines 25-31).
- VDSL provides higher bit rate transmissions than ADSL at higher frequencies than ADSL using lines of shorter distance (Bingham; col. 2, lines 1-8).
- Higher frequency transmissions are badly attenuated over longer line lengths (Bingham; col. 2, lines 30-37). That is, the high frequency transmissions of VDHL would be attenuated over longer line lengths (i.e. VHDL should be utilized over only shorter lines only).
- Lines of various length may be utilized to offer various bit rates of data transmission (Bingham; col. 5, lines 15-25).
- VDSL provides 26Mb/s downstream and 5Mb/s upstream over distances not to exceed 3000ft while ADSL provides 9Mb/s downstream and 640kb/s upstream over distances up to 9000ft (Eames; col. 9, lines 5-20).

In this case, the determination of the system parameter is according to the attenuation of the line length. Therefore, according to the attenuation of the line, one is **at least motivated** by the grouping disclosed by Eames to group lines into shorter and longer distances according to the achievable bit rate of the line length in the system of Bingham. Further, the use of FDD and OFDD is plainly disclosed by Bingham in view of Eames. The Applicant is reminded, additionally, that FDD is a subset of OFDD. Therefore, any disclosure or teaching of using OFDD by the ADSL transmission protocol over shorter lines inherently meets the limitation of the use of FDD.

To overcome the rejection, the Applicant must specifically note a claim limitation which is not met by the combination of Bingham in view of Eames or a true hole in the

Art Unit: 2634

Examiner's reasoning which leads to a bone fide implication of the use of hindsight reasoning.

Drawings

5. The proposed drawing sheet 1/1 figure 1 is approved by the Examiner. The Applicant is required to submit a formal drawing replacement sheet before payment of any issue fee.

Claim Objections

6. Claims 40-42 are objected to because of the following informalities:

Regarding claim 40, in line 2, "wherein second" should be replaced by --wherein the second--.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 27, 33, 35, 37-39, 43, 49, 51, 53, and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bingham et al (5838667; hereafter "Bingham") in view of Eames (US 6282189).

Regarding claim 27, Bingham discloses a telecommunications system (fig. 1(a); abstract) comprising: a central station (fig. 1(a), ref. 201; col. 4, lines 42-46); subscriber lines of different lengths or lengths which vary by a fair amount (fig. 1(a); col. 4, lines 42-

Art Unit: 2634

46; col. 5, lines 14-16), and plurality of data modems (fig. 1(a), refs. R1-R_N) connected to the central station by the subscriber lines of different lengths with duplex data being transmitted between the central station and at least one data modem using very high rate digital subscriber line (VDSL) (col. 5, lines 16-25; col. 1, line 66 – col. 2, line 8).

Bingham does not explicitly disclose (a) the subscriber lines being grouped into longer and shorter lines, shorter lines are defined as lines having a length less than X, and longer lines are defined as lines having a length equal to or greater than X where X is a system parameter determined for a given telecommunications system; or (b) frequency divided duplex (FDD) is used at lower frequencies for transmissions over the longer lines and orthogonal frequency divided duplex (OFDD) is used at higher frequencies for transmissions over the shorter lines. However, Bingham, as well as additional references of analogous prior art, contain teachings which would lead one having ordinary skill in the art to arrive at the claimed limitations (a) and (b) above.

Regarding limitation (a) Bingham teaches not only that the various subscriber lines vary in length, but also that the possible data rates that subscriber lines are capable of carrying varies according the length of the lines. Bingham teaches that VDSL, in contrast to ADSL, is capable of achieving higher data rates although the transmissions must be implemented on shorter lines (col. 1, lines 24-33; col. 1, line 65 – col. 2, line 8). Therefore, Bingham provides teachings that VDSL is better suited for subscriber lines of shorter length. Further, Bingham teaches that VDSL is capable of transmitting over line lengths of up to 3000 ft or 5000 ft (col. 5, lines 15-25). While Bingham discloses both ADSL and VDSL, Eames *specifically* teaches that VDSL and

Art Unit: 2634

ADSL differ in the length of the subscriber line which they are applied (col. 9, lines 11-19). Eames teaches analogous digital subscriber line systems and methods and that VDSL should only be applied over distances not to exceed 3000 ft whereas ADSL may be capable of providing service to subscribers at line distances of up to 9000-12000 ft. Therefore, in the case of line lengths which vary over a wide range (Bingham; col. 5, lines 14-16) such as 1000 ft to 9000 ft, the teachings of Eames applied to the system of Bingham is such that the lines would be grouped into lines of length for VDSL (approx. 5000 ft. or less) and lines of length for ADSL (approx 5000 ft. or more; i.e. "X" = 5000 ft). Although the exact distinction "X" separating the lines of longer length from those of shorter length may be a variable matter of design choice, the motivation is such that the lines would be appropriately divided for use with either VDSL or ADSL (i.e. "X" divides VDSL vs. ADSL). Hence, a distinction "X" must be made between the line lengths to provide subscriber service to a group of customers having line lengths that may vary between 1000 ft and 9000 ft so that the highest possible data rate transmissions may be provided to those customers with the shorter line lengths and the customers with longer line lengths may still receive service at a lower data rate. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to separate the subscriber lines into lines longer than X and lines shorter than X as taught by Eames and suggested by Bingham in the system of Bingham because lines of shorter length are capable of the highest data rate transmissions of VDSL transmission and lines of longer length are still capable of ADSL transmission speeds at a lower data rate.

Regarding limitation (b) Bingham teaches that ADSL uses frequency divided duplex or FDD (col. 1, lines 60-65) and that VDSL uses the combination FDD discrete multi-tone (col. 2, lines 15-23) or OFDD. It is well known in the art that DMT is the equivalent to OFDD as noted in the specification (pg. 8, lines 19-20). Further, Bingham teaches that VDSL is generally utilized in lines with shorter lengths (col. 2, lines 5-8) and that longer line lengths attenuate higher frequency signals (col. 2, lines 32-38). Thereby, Bingham teaches that VDSL using OFDD is likely to be used over the shorter lines (as applied to limitation (a) above) and that the longer lines (ADSL using FDD as applied to limitation (a) above) are likely to use lower frequencies. Further, Bingham discloses that VDSL may occupy frequencies as high as 51.92 Mhz at the largest possible data rate or lower frequencies for progressively lesser data rates (col. 5, lines 15-25). It is also disclosed by Bingham that typical ADSL may use a bandwidth of approximately 1.1 Mhz (col. 1, lines 24-33). Therefore, with such combined teachings of Bingham that longer lines attenuate higher frequencies and VDSL uses higher frequencies than ADSL, it is obvious that the higher frequencies and data rates of VDSL should be applied to the shorter lines, and it is further obvious that the lower frequencies and data rates of ADSL should be applied to the longer lines because the characteristics of a subscriber loop system having lines of varying length require the use of lower frequencies at longer line length and higher frequencies at shorter line length to maximize the overall throughput and reliability of the system.

Regarding claim 33, Bingham in view of Eames discloses the limitations of claim 27 as applied above. Further, Bingham discloses that in both ADSL and VDSL different

sub-carriers are used in both the up-stream and down-stream transmission directions (col. 1, lines 25-55; col. 2, lines 15-25).

Regarding claim 35, Bingham in view of Eames discloses the limitations of claim 27 as applied above. Further, Bingham discloses that both ADSL and VDSL are used because ADSL is used over the longer lines and VDSL is used over the shorter lines.

Regarding claim 37, Bingham in view of Eames discloses the limitations of claim 35 as applied above. Further, Bingham discloses that FDD is used for ADSL (col. 1, lines 60-65).

Regarding claim 38, Bingham in view of Eames discloses the limitations of claim 35 as applied above. Further, Bingham discloses that FDD is used for ADSL (col. 1, lines 60-65). Therefore, the FDD band frequencies are "power boosted" to the same level as the ADSL frequencies because FDD band frequencies are ADSL band frequencies as applied to claim 27 above and as broadly as claimed.

Regarding claims 39 and 43, the limitations of the claims are disclosed by Bingham in view of Eames as applied to claim 27 above.

Regarding claim 49, the limitations of the claim are disclosed by Bingham in view of Eames as applied to claim 33 above.

Regarding claim 51, the limitations of the claim are disclosed by Bingham in view of Eames as applied to claim 35 above.

Regarding claim 53, the limitations of the claim are disclosed by Bingham in view of Eames as applied to claim 37 above.

Regarding claim 54, the limitations of the claim are disclosed by Bingham in view of Eames as applied to claim 38 above.

9. Claims 28-32, 40-42, and 44-48 rejected under 35 U.S.C. 103(a) as being unpatentable over Bingham in view of Eames, and in further view of Younce et al (US 5521908; hereafter Younce).

Regarding claim 28, Bingham in view of Eames disclose the limitations of claim 1 as applied above. Bingham in view of Eames do not specifically disclose that (a) an extra cyclic prefix is used for the OFDD or VDSL transmissions over the shorter lines or (b) that frequencies above an FDD or ADSL band are not used for longer lines. However, regarding limitation (b), it is obvious, as applied to claim 1 above, that any frequencies above the FDD band used for ADSL over the longer lines would not be used because longer lines attenuate higher frequencies. Further, regarding limitation (b), although Bingham in view of Eames do not specifically disclose the limitation, Younce teaches that DMT or OFDD uses a cyclic prefix which is determined according to the length of the impulse response of the channel or subscriber line (col. 1, lines 14-38) to eliminate intersymbol interference. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to apply an extra cyclic prefix to the OFDD transmissions over the shorter lines as taught by Younce because they could advantageously be utilized to remove any intersymbol interference.

Regarding claim 29, Bingham in view of Eames, and in further view of Younce disclose the limitations of claim 28 as applied above. Further, as applied to claim 28 above, the cyclic prefix is dimensioned for the shorter line or channel used for VDSL

Art Unit: 2634

(Younce; col. 1, lines 15-38) because a cyclic prefix is used for DMT or OFDD and the OFDD transmission method is used to provide VDSL over the shorter lines.

Regarding claim 30, Bingham in view of Eames, and in further view of Younce disclose the limitations of claim 29 as applied above. Further, Younce teaches that the cyclic prefix should be dimensioned for a line of length X. This is the case because Younce teaches that the prefix used with OFDD is dimensioned for the length of the channel (the shorter line using OFDD VDSL up to the length of X) exactly to overcome the intersymbol interference without unduly adding overhead to the transmission and thereby reducing the efficiency of the transmitter (col. 1, lines 28-38).

Regarding claim 31, Bingham in view of Eames, and in further view of Younce disclose the limitations of claim 28 as applied above. Further, Bingham discloses the in the telecommunications system (figs. 1(a) and 1(b)) the central station (fig. 1(b) ref. 202) is an optical network unit (ONU) (col. 4, line 62 – col. 5, line 5) and, as broadly as claimed, the remote units R_1 - R_N are network terminations. It is inherent that each of the ONU's and NT's comprise at least one transmitter because full duplex or two way communication is provided between them via VDSL or ADSL subscriber service over the subscriber lines. Further, Bingham discloses that, to reduce cross talk interference, time synchronization is performed between the ONU's and the NT's (col. 2, lines 48-63; col. 7, lines 17-26).

Regarding claim 32, Bingham in view of Eames, and in further view of Younce disclose the limitations of claim 28 as applied above. Further, Bingham discloses that timing advance or, as broadly as claimed, timing synchronization is calculated for each

Art Unit: 2634

subscriber based upon the subscriber line length (col. 2, lines 48-63; col. 7, lines 17-26). Bingham discloses that for each of the subscriber lines (fig. 6; ref. 206 and above), the timing advance or timing synchronization is calculated or found (col. 7, lines 25-50). In the system of Bingham in view of Eames, and in further view of Younce, it is inherent that the timing synchronization of the full duplex communications between the data modems and the central station would, at least in part, be attributed to the various lengths of the subscriber lines used. Therefore, it is found that timing advance is calculated for each of the subscriber lines based upon, at least in part, the length of the lines.

Regarding claims 40 and 44, the limitations of the claims are disclosed by Bingham in view of Eames, and in further view of Younce as applied to claim 28 above.

Regarding claims 41 and 45, the limitations of the claims are disclosed by Bingham in view of Eames, and in further view of Younce as applied to claim 29 above.

Regarding claims 42 and 46, the limitations of the claims are disclosed by Bingham in view of Eames, and in further view of Younce as applied to claim 30 above.

Regarding claim 47, the limitations of the claim are disclosed by Bingham in view of Eames, and in further view of Younce as applied to claim 31 above.

Regarding claim 48, the limitations of the claim are disclosed by Bingham in view of Eames, and in further view of Younce as applied to claim 32 above.

10. Claims 34 and 50 rejected under 35 U.S.C. 103(a) as being unpatentable over Bingham in view of Eames, and in further view of Dichter (US 5896443).

Regarding claim 34, Bingham in view of Eames disclose the limitations of claim 27 as applied above. Bingham in view of Eames do not specifically disclose that a power boost is applied to FDD band frequencies used for ADSL. However, Dichter teaches that in a system using ADSL, it may be required to supply a large amount of power to the ADSL transmissions because ADSL transmissions over long line lengths must be powerful enough to overcome parasitic losses due to the long line length (col. 1, lines 63-68). Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to apply a power boost to FDD band frequencies as taught by Dichter in the system of Bingham in view of Eames because the FDD band frequencies used to provide ADSL services over longer transmission lines may require a power boost to overcome parasitic losses due to long line lengths.

Regarding claim 50, Bingham in view of Eames, and in further view of Dichter discloses the limitations of the claim as applied to claim 34 above.

Allowable Subject Matter

11. No claims are allowed.

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

Art Unit: 2634

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

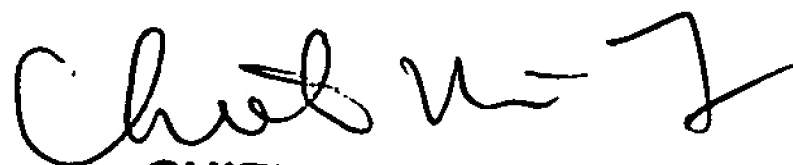
13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Perilla whose telephone number is (571) 272-3055. The examiner can normally be reached on M-F 8-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on (571) 272-3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Jason M. Perilla
June 3, 2005



CHIEH M. FAN
PRIMARY EXAMINER

jmp